

O 1: Overview Talk: Stacey Bent

Time: Monday 9:30–10:15

Location: H15

Invited Talk

O 1.1 Mon 9:30 H15

Fundamentals of Atomic Layer Deposition — ●STACEY BENT —
Stanford University, Stanford, CA, USA

With the growing interest in functional nanoscale materials for applications such as electronics, catalysis, and energy conversion, methods for fabricating materials with atomic-level control are becoming increasingly important. Atomic layer deposition (ALD) is a vapor-based method that provides excellent capabilities for depositing thin solid films, nanoparticles, and other nanoscale inorganic materials. Based on sequential, self-limiting reactions, ALD offers exceptional conformality, thickness control at the Angstrom level, and tunable film composition. This presentation will introduce ALD and provide background on the

ALD process used for growing inorganic metallic, semiconducting and insulating materials. It will also describe molecular layer deposition (MLD), in which self-limiting reactions of organic precursors lead to growth of precisely controlled, nanoscale organic thin films. Fundamental nucleation processes in ALD, including surface reactions as well as the evolution of the structure and morphology of deposited nanoscale materials, will be introduced. Moreover, many ALD nucleation processes have a dependence on the substrate upon which the film is deposited, and the ways that this property can be exploited to achieve selective deposition will also be described. Finally, the talk will showcase recent examples in which the precise control provided by ALD has been used to enable structures such as tandem solar cells and novel catalysts.